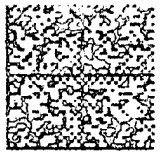
Organization TC 3600 Bldg/Room KNOX
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
If Undeliverable Return in Ten Days

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

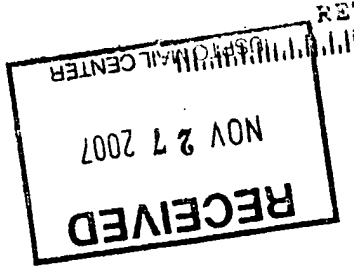
AN EQUAL OPPORTUNITY EMPLOYER



UNITED STATES POSTAGE
$ 01.48⁰
MAILED FROM ZIP CODE 22314

AERO900* 8030233002 1836 11 11/19/07
FORWARD TIME EXP RTN TO SEND
:AEROGROW INTERNATIONAL INC
6075 LONGBOW DR
BOULDER CO 80301-3203

RETURN TO SENDER



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

10/528,110

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
	07/15/2005	W Michael Bissonnette	04-06A	9031

7590 11/14/2007
International Inc
et
Su
Bo CO 8 303

EXAMINER
VALENTI, ANDREA M

ART UNIT	PAPER NUMBER
3643	

MAIL DATE	DELIVERY MODE
11/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.	Applicant(s)	
10/528,110	BISSONNETTE ET AL.	
Examiner	**Art Unit**	
Andrea M. Valenti	3643	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-18,30,32,34,54,64 and 211* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-18,30,32,34,54,64 and 211* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 54 is objected to because of the following informalities:

Claim 54, line 7, "for elevating and elevating" should merely be --for elevating--

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 64 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 64, section a), states "a liquid means for removably suspending one or more of a plant, seed, a growth medium for contacting a said plant or seed, and a net basket". It is not clear if applicant intends to claim one plant, one seed, one growth medium **or** one net basket. Or does applicant intend to claim either a plant, a seed, or a growth medium, in combination with a net basket? Examiner for examination purposes interprets it as one plant, one seed, one growth medium **or** one net basket. Clarification requested.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 211, 1, 4, 5, 7, 9, 10, 12, 13, 16-18, 34, 54, 64 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 4,976,064 to Julien.

Regarding Claim 211, Julien teaches a device for growing a plant or germinating a seed into a plant, wherein said plant may have one or more roots, said device for covering a vessel for containing a liquid, said device comprising: a) a means for removably suspending said plant (Julien Fig. 1 #6) in a gas (Julien Fig. 1 #3) above said liquid (Julien Fig. 1 #2); b) a means for elevating a first portion of said liquid (Julien Fig. 1 #9 right side) above the remaining liquid in said vessel and into said gas wherein said first portion of liquid falls through said gas into said remaining liquid; and c) a means for contacting a second portion of said liquid (Julien Fig. 1 #9 left side) with said plant, seed, or a growth medium contacting said plant or seed and allowing said second portion of liquid to return to the remaining liquid; whereby said one or more roots are permitted to grow in said gas and in said remaining liquid.

Regarding Claims 1, 4, 5, Julien teaches a device for growing a plant or germinating a seed into a plant, wherein said plant may have one or more roots, said device comprising: a) a vessel (Julien Fig. 1 #1) for containing a liquid; b) a means for removably suspending said plant (Julien Fig. 1 #6) in a gas (Julien Fig. 1 #3) above said liquid (Julien Fig. 1 #2); c) a means for elevating a first portion of said liquid (Julien Fig. 1 #9 right side) above the remaining liquid in said vessel and into said gas wherein said first portion of liquid falls through said gas into said remaining liquid; and d) a means for

contacting a second portion of said liquid (Julien Fig. 1 #9 left side) with said plant, seed, or a growth medium contacting said plant or seed and allowing said second portion of liquid to return to the remaining liquid; whereby said one or more roots are permitted to grow in said gas and in said remaining liquid.

Regarding Claim 34, Julien teaches a method for growing a plant or germinating a seed into a plant, wherein said plant has at least one root, said method comprising: a) providing a vessel (Julien Fig. 1 #1) for containing a liquid; b) providing a means for removably suspending said plant (Julien Fig. 1 #6) in a gas (Julien Fig. 1 #3) above said liquid (Julien Fig. 1 #2); c) providing a conduit (Julien Fig. 1 #9) in fluid communication with said liquid and said gas; and d) providing a means for delivering and delivering a first portion and a second portion (Julien Fig. 1 #9 and #12 coming from left and right side) of said liquid through said conduit whereby said first portion of liquid falls through said gas into the remaining liquid in said vessel, and whereby said second portion of liquid contacts said plant, said seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid; whereby said root of said plant is permitted to grow in said gas and in said remaining liquid.

Regarding Claim 54, Julien teaches a method for delivering oxygen to a plant or seed which will germinate into a plant, said method comprising: a) providing a plant with at least one root or a seed which will germinate into a plant having at least one root; b) providing a liquid (Julien Fig. 1 #2 is "capable of") ***capable of*** having oxygen dissolved therein; c) providing a gas comprising oxygen gas (Julien Fig. 1 #3 air space, air inherently has oxygen in it); d) providing a means for elevating (Julien Fig. 1 #9) a

portion of said liquid above the remaining liquid; e) allowing said portion of liquid to fall through (Julien Fig. 1 #12) said gas into said remaining liquid whereby oxygen gas dissolves in said portion of liquid or said remaining liquid thereby forming oxygenated liquid; and f) providing a means (Julien Fig.1 #6) for contacting and contacting said plant or seed with said oxygenated liquid.

Regarding Claim 64, Julien teaches a method for increasing the dissolved oxygen concentration in a liquid within a hydroponics device comprising: a) providing a hydroponics device comprising: a vessel (Julien Fig. 1 #1) for containing a liquid; a means for removably suspending (JUlien Fig. 1 #6, suspends a plant) ***one*** or more of a plant, seed, a growth medium for contacting said plant or seed, and a net basket in a gas above said liquid; and a means for elevating (Julien Fig. 1 #9) a first portion and a second portion of said liquid above said remaining liquid and into said gas whereby said first portion (Julien Fig. 1 #12 right side) of liquid falls through said gas (Julien Fig. 1 #3) into the remaining liquid (Julien Fig. 1 #2) in said vessel, and whereby said second portion of liquid (Julien Fig. 1 #12 right side) can contact said plant, said seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid; whereby said root of said plant is permitted to grow in said gas and in said remaining liquid; b) elevating said first portion of liquid (Julien Fig. 1 #9 right side) above said remaining liquid and into said gas; c) elevating said second portion of liquid (Julien Fig. 1 #9 left side) above said remaining liquid and into said gas; d) allowing said first portion of liquid to fall through said (Julien Fig. 1 #12 right side) gas and into said remaining liquid; and e) allowing said second portion of liquid (Julein Fig. 1 #12 left side) to

contact said plant, seed, growth medium, or net basket and descend into said remaining liquid; whereby the dissolved oxygen concentration in said first portion of liquid, in said remaining liquid, or in both is increased.

Regarding Claim 9, Julien teaches said second portion of liquid contacts said plant, seed, or said growth medium at about or below the height of said seed or transition region of said plant (Julien Fig. 1 #12).

Regarding Claim 10, Julien teaches for growing more than one plant (Julien Col. 3 line 11 "openings 5").

Regarding Claim 12, Julien teaches a first portion of liquid only contacts said gas and said remaining liquid (Julien Fig. 1 #12 left side shows that some of the drops do not come in contact with the plant and thus only contact the gas and remaining liquid).

Regarding Claim 13, Julien teaches said conduit has separate first and second exits (Julien Fig. 1 #9 left and right side) for said first and said second portions of liquid.

Regarding Claim 16, Julien inherently teaches said first portion of liquid falling through said gas (Julien #12 Fig. 1 right side) into said remaining liquid increases the dissolved oxygen content of said remaining portion of liquid or said first portion of liquid or both.

Regarding Claim 17, Julien inherently teaches said first portion of liquid falling (Julien #12 falls into #2 Fig. 1) into said remaining liquid increases negative ions within said device.

Regarding Claim 18, Julien teaches said liquid and said one or more roots are completely contained in one vessel (Julien Fig. 1 #1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 8, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,976,064 to Julien.

Regarding Claim 32, Julien teaches a kit for growing a plant or germinating a seed into a plant, said kit comprising: a) a device for growing a plant or germinating a seed into a plant wherein said plant has one or more roots comprising: 1) a vessel (Julien Fig. 1 #1) for containing a liquid; 2) a means for removably suspending (Julien Fig. 1 #6) said plant in a gas (Julien Fig. 1 #3) above said liquid (Julien Fig. 1 #2); 3) a conduit (Julien Fig. 1 #9) in fluid communication with said liquid and said gas; and 4) a means for delivering a first portion and a second portion of said liquid (Julien Fig. 1 #12 left side and right side) through said conduit whereby said first portion of liquid falls through said gas into the. remaining liquid in said vessel and said second portion of liquid contacts said plant, said seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid; whereby said one or more roots are permitted to grow in said gas and in said remaining liquid.

Julien is silent on explicitly teaching instructions for using said device are provided. However, the examiner takes official notice that it is old and notoriously well-known to provide instructions with merchandise e.g. TVs, cars, lawnmowers, cake box,

toys etc come with instructions how to operate and assembly the device safely. It would have been obvious to one of ordinary skill in the art to modify the teachings of Julien at the time of the invention since the modification is merely the use of a known technique yielding predictable results.

Regarding Claim 6, Julien teaches drops and how the aperture sizes affect the pressure (Julien Col. 3 line 40-42), but is silent on explicitly teaching said drops have diameters greater than about 200 microns, greater than about 350 microns, greater than about 500 microns, greater than about 1000 microns, greater than about 2000 microns, or greater than about 5000 microns. However, it would have been obvious to one of ordinary skill in the art to modify the teachings of Julien at the time of the invention since the modification merely depends on the selected plant variety and desired application pressure. The modification is merely a change in size yielding predictable results, choosing from a finite number of identified, predictable solutions with a reasonable expectation of success.

Regarding Claim 8, Julien is silent on teaching comprising a means for delivering a third portion of said liquid through said conduit whereby said third portion of liquid falls through said gas, is permitted to contact said one or more roots, and contacts said remaining liquid. However, it would have been obvious to one of ordinary skill in the art to modify the teachings of Julien at the time of the invention since the modification is merely the duplication of a known element (Julien #9) for a multiple effect to meet the liquid needs of different plant varieties to enhance healthy growth and development [*In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960)].

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,976,064 to Julien in view of U.S. Patent No. 4,170,844 to Steele.

Regarding Claim 30, Julien teaches delivering a first portion and a second portion of said liquid through said conduit (Julien Fig. 1 #12 and 9 left and right side) whereby said first portion (Julien Fig. 1 #12 right side) of liquid falls through said gas into the remaining liquid in said vessel and said second portion of liquid (Julien Fig. 1 #12 left side) contacts said plant, seed, or a growth medium contacting said plant or seed, and descends into said remaining liquid; whereby said plant grows and a root of said plant is permitted to grow in said gas and in said remaining liquid providing carbon dioxide and oxygen (Julien air space #3 contains air which inherently contains both oxygen and carbon dioxide; Julien Col. 1 line 13 and 17); nutrients (Julien Col. 1 line 9)

Julien is silent on explicitly teaching and c) providing light to said plant. However, Steele teaches it is notoriously well-known to provide light to growing plants (Steele #46). It would have been obvious to one of ordinary skill in the art to modify the teachings of Julien with the teachings of Steele at the time of the invention to enhance plant health and development. The modification is merely the application of a known technique to a known device to yield predictable results.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,976,064 to Julien in view of U.S. Patent No. 4,332,105 to Nir.

Regarding Claim 15, Julien is silent on said first portion of liquid is delivered substantially vertically downward. However, Nir teaches a first and second liquid delivery an that the first delivery is substantially vertically downward (Nir Fig. 6 #146). It would have been obvious to one of ordinary skill in the art to modify the teachings of Julien with the teachings of Nir at the time of the invention to meet the needs of various plant varieties to ensure healthy development. The modification is merely the application of a known technique to a known similar device yielding predictable results.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,976,064 to Julien in view of U.S. Patent No. 4,177,604 to Friesen.

Regarding Claim 11, Julien a means for delivering said second portion of liquid to each of a plurality of plants separately. However, Friesen teach it is notoriously well-known to administer a liquid to a plurality of plants, but to each plant separately (Friesen Fig. 1 #24 and #42, each container #42 has its own #24). It would have been obvious to one of ordinary skill in the art to modify the teachings of Julien with the teachings of Friesen at the time of the invention for an efficient use of liquid to prevent wasting the liquid and to ensure each plant receives liquid.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent Pub. No. US 2003/0089037; U.S. Patent No. 2,431,890; U.S. Patent No. 5,394,647; U.S. Patent No. 6,021,602; U.S. Patent No. 4,454,684; U.S. Patent No.

4,584,791; U.S. Patent No. 5,136,804; U.S. Patent No. 2,855,725; U.S. Patent No. 3,168,797; Japanese Patent JP 04200328 A.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrea M. Valenti whose telephone number is 571-272-6895. The examiner can normally be reached on 7:00am-5:30pm M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter M. Poon can be reached on 571-272-6891. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andrea M. Valenti
Primary Examiner
Art Unit 3643

09 November 2007

Notice of References Cited	Application/Control No. 10/528,110	Applicant(s)/Patent Under Reexamination BISSONNETTE ET AL.	
	Examiner Andrea M. Valenti	Art Unit 3643	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-4,177,604	12-1979	Friesen, David L.	47/62R
*	B	US-4,976,064	12-1990	Julien, Philippe	47/63
*	C	US-4,170,844	10-1979	Steele, Richard S.	47/62R
*	D	US-4,332,105	06-1982	Nir, Isaac	47/1.01R
*	E	US-2003/0089037	05-2003	Ware, Larry Austen	47/83
*	F	US-2,431,890	12-1947	RAINES MORRIS A	47/62A
*	G	US-5,394,647	03-1995	Blackford, Jr., John W.	47/62A
*	H	US-6,021,602	02-2000	Orsi, Marco	47/62A
*	I	US-4,454,684	06-1984	O'Hare, Louis R.	47/82
*	J	US-4,584,791	04-1986	Wolf, Rodney A.	47/62C
*	K	US-5,136,804	08-1992	Rothem et al.	47/60
*	L	US-2,855,725	10-1958	CAROTHERS CHARLES H	47/17
*	M	US-3,168,797	02-1965	PATASSY FRANK Z	47/79

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	JP 04200328 A	07-1992	Japan	Ogawa	A01G 31/00
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PAT-NO: JP404200328A

DOCUMENT-IDENTIFIER: **JP 04200328 A**

TITLE: APPARATUS FOR WATER CULTURE

PUBN-DATE: July 21, 1992

INVENTOR-INFORMATION:
NAME
OGAWA, SUMUTO

ASSIGNEE-INFORMATION:

NAME	COUNTRY
SUZUKI MOTOR CORP	N/A

APPL-NO: JP02336034

APPL-DATE: November 30, 1990

INT-CL (IPC): A01G031/00

US-CL-CURRENT: **47/62R**

ABSTRACT:

PURPOSE: To reduce the difference of temperature as much as possible by arranging a humidity-keeping material capable of absorbing and holding a nutritive solution in a hollow bed where plant bodies are passed through the upper plane thereof and held thereby.

CONSTITUTION: When a nutritive solution is fed under pressure from a nutritive solution feeder 40 to a spraying pipe 120, the nutritive solution is sprayed to the inner space 130 of a bed (A). Although the nutritive solution feeder 40 is periodically operated, the humidity in the space 130 in an idle time is lower in comparison with that in an operation time. A humidity-keeping

material 50 is used for the purpose of making up for the shortage of nutrients
and the nutritive solution absorbed in the humidity- keeping material itself
keeps the humidity in the space 130 in an idle time of the nutritive solution
feeder 40 to a correct level. On the other hand, supporting blocks 82 function
as an auxiliary unit for absorption of nutrients. That is to say, a young
seedling of a plant can not absorb water or nutrients in the air in general and
the supporting blocks 82 help nutrient absorption of the plants 90 by the
nutritive solution absorbed and held therein. Part of the sprayed nutritive
solution passes through vent holes 22 formed in a panel 20 and reaches the
neighborhood of the leaves of the plants 90 also, thus supplying the nutrients
and water to the leaves.

⑲日本国特許庁(JP)　⑪特許出願公開

⑫公開特許公報(A)　平4−200328

⑤Int.Cl.[5]　識別記号　庁内整理番号　⑬公開　平成4年(1992)7月21日
A 01 G 31/00　C　6572−2B

審査請求　未請求　請求項の数 1　(全4頁)

⑭発明の名称　水耕栽培装置

⑳特　願　平2−336034
㉒出　願　平2(1990)11月30日

⑫発明者　小川　澄人　静岡県浜名郡可美村高塚300番地　スズキ株式会社内
⑪出願人　スズキ株式会社　静岡県浜松市高塚町300番地
⑭代理人　弁理士　木村　高久

明　細　書

1．発明の名称

水耕栽培装置

2．特許請求の範囲

植物が上面に貫通支持される中空状のベッドを備え、上記ベッド内に養液を噴霧して上記植物を育成する水耕栽培装置において、

上記養液を吸収保持する保湿体を上記ベッド内に配置したことを特徴とする水耕栽培装置。

3．発明の詳細な説明

〔産業上の利用分野〕、

本発明は、水耕栽培装置の改良に関する。

〔従来の技術〕

植物が貫通支持される中空状のベッドを備え、上記ベッド内に養液を噴霧して上記植物を育成する水耕栽培装置~~植物~~が実用されている。

〔発明が解決しようとする課題〕

上記養液噴霧式の水耕栽培装置は、養液を噴霧している時と噴霧していない時における上記空間の湿度差が大きく、そのため非噴霧時に湿度不足を生じる虞れがある。

本発明の目的は、かかる状況に鑑み、上記湿度差を可及的に少なくすることができる水耕栽培装置を提供することにある。

〔課題を解決するための手段〕

本発明は、植物が上面に貫通支持される中空状のベッドを備え、該ベッド内に養液を噴霧して上記植物を育成する水耕栽培装置において、上記養液を吸収保持する保湿体を上記ベッド内に配置するようにしている。

〔作用〕

上記保湿体によって養液が吸収保持される。したがって、養液の非噴霧時においては、保湿体に吸収保持された養液によって上記ベッド内が適正な湿度状態に置かれる。

〔実施例〕

以下、図面を参照しながら本発明の実施例について説明する。

本発明に係る水耕栽培装置は、第１図にその一実施例を示すように、有底の箱状体からなる支持台１０と、この支持台１０の上部に載置した発砲スチロール等からなるパネル２０と、上記支持台１０の側方に配置した送風機３０および養液送給機４０とを備え、上記支持台１０とパネル２０によって中空状のベッドＡを構成している。

第２図に示したように、上記支持台１０の底部全域には、ロックウールからなる保湿体５０が敷設され、また該支持台１０の一方の側壁１１には、換気扇６０を取付けた換気窓１２が設けられている。

上記パネル２０には、第３図に示したような四角状のポット挿入穴２１が所定の間隔で貫通形成され、さらに第１図に示したように、これらの穴２１の周囲にそれぞれ複数個の通気穴２２が所定の間隔で貫通形成されている。

第３図に示したように、上記パネル２０に設けられた穴２１には、第３図に示す栽培ポット８０が挿着される。

この栽培ポット８０は、上端に外向きのフランジ部８１が形成された籠である。この栽培ポット８０底部には、ロックウール、スポンジ等の保湿性材料で形成された支持ブロック８２が配置されており、この支持ブロック８２の上部に幼苗の植物９０が置かれている。

なお、上記栽培ポット８０の網目部分は、収穫時に植物を傷つけないため、ナイロン、綿等の柔らかい素材で形成することが望ましい。

上記穴２１に栽培ポット８０が挿着された場合、上記支持ブロック８２はパネル２０の下面から突出する。また、フランジ部８１の下面に所定の間隔で設けられた突起８１ａがパネル２０の上面に突き刺って、栽培ポット８０がパネル２０に固定される。

かくして、植物９０は栽培ポット８０を介してパネル２０に支持されることになる。

パネル２０の側部上面には、該パネルの長手方向に沿う態様で外部送風用パイプ１００が配設され、また支持台１０の他方の側壁１３には内部送風用パイプ１１０および噴霧用パイプ１２０が開口している。そして、送風用パイプ１００，１１０の基部に前記送風機３０が連結され、噴霧用パイプ１２０の基部に前記養液送給機４０連結されている。

なお、上記噴霧用パイプ１２０の先端部には、図示していない噴霧用ノズルが取付けられている。

この実施例において、養液送給機４０から噴霧用パイプ１２０に養液が圧送されると、上記ベッドＡの内部空間１３０に養液が噴霧される。

噴霧された養液は、送風用パイプ１１０の先端から放出されるエアによってに拡散され、その一部は前記保湿体５０と栽培ポット８０の支持ブロック８２に吸収される。

ところで、上記養液送給機４０は定期的に運転されるが、その運転時と非運転時とでは上記空間１３０の湿度が相違する。すなわち、上記空間１３０の湿度は、上記運転時に比して非運転時の方が低くなる。

上記湿度は養分の量を表すので、非運転時の湿度が低すぎると、植物９０が養分不足になり、とくに植物９０がある大きさまで成長した際の養分不足が顕著となる。

上記保湿体５０は、上記養分不足を補う目的で設けたものであり、それ自身に吸収された養液によって養液送給機４０の非運転時における上記空間１３０内の湿度を適正な高さに保持させる。

一方、上記支持ブロック８２は養分吸収補助手段として機能する。すなわち、一般に植物の幼苗は空気中の水分および養分を吸収する能力に欠けるが、上記支持ブロック８２は吸収保持した養液によって植物９０の養分吸収を助ける。

上記噴霧養液の一部は、パネル２０に形成された通気穴２２を通って植物９０の葉の周囲にも到達し、この葉に養分と水分を与える。

なお、前記換気扇６０を運転すれば、空間１３０内の通気性が向上され、かつ養液中に農薬が含まれている場合に、空間１３０内の残留農薬を減少させることができる。

ところで、ラン等の植物でよく見られる軟腐病

等の細菌性の病気は、葉が蒸れるために発生する。そこで上記実施例では、前記外部送風用パイプ１００の側方に形成したエア吹出口１０１からエアを放出させ、このエアによって植物９０の葉面間の通風を行っている。したがって、この実施例によれば、上記葉の蒸れが可及的に抑制される。

上記実施例の水耕栽培装置はこのように作用するので、とくにファレノプシス、パフィオペディウム等の着生ラン（樹に着生しているもの）や半着生ラン（同じ属の中で地生種と着生種があるもの）の栽培に用いて好適である

すなわち、着生ランは自生状態では自然に降る雨と、夕方から夜半に降りる露のみで育っているので、乾燥に強い半面、常に水分を供給すると根が傷んでしまう。

ところが、上記実施例は、養液送給機４０の養液送給量と換気扇６０の換気量およびそれらの運転時間をマイコン等で適宜調節することが可能であるから、着生ランの栽培および半着生ランの中の着生種の栽培に適した水分供給環境を作り出すことができる。

なお、ランを栽培する場合には、フラスコから取出した幼苗が上記栽培ポット８０に移される。

また、上記実施例では保湿体５０の材料としてロックウールを用いているが、保湿体５０をスポンジ等の他の保湿材料で形成しても良い。

〔発明の効果〕

本発明によれば、ベッド内に配置した保湿体によって養液が吸収保持されるので、養液が噴霧されていない場合に、この保湿体に吸収保持された養液によってベッド内の湿度が適正に保持される。つまり、養液の噴霧時と非噴霧時におけるベッド内の湿度差が少なくなる。

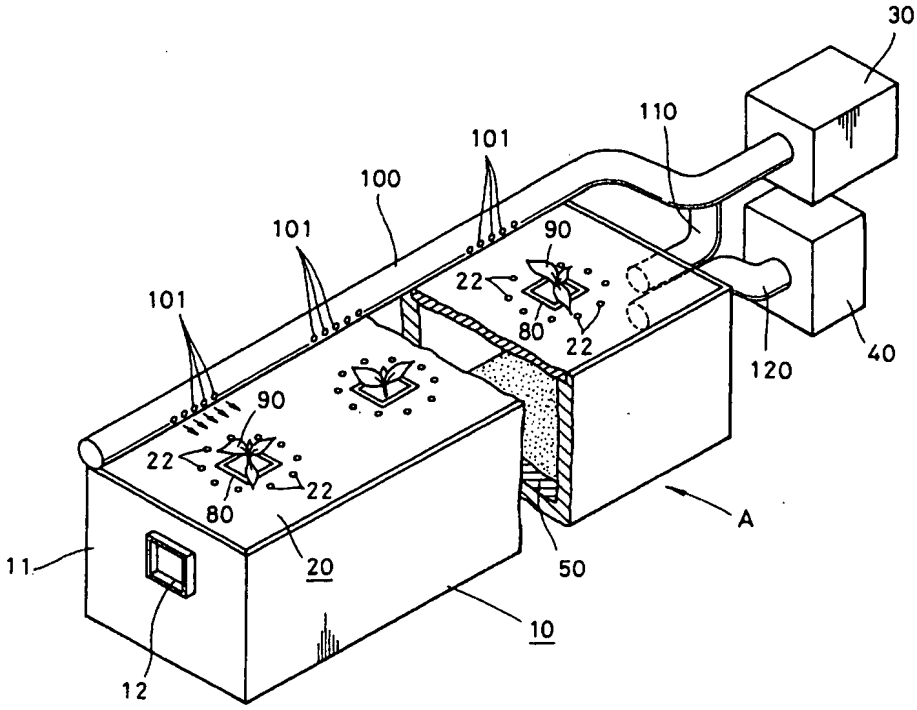
したがって、植物の養分不足、とくに該植物が成長した場合の養分不足を防止して、その発育を促進することができる。

４．図面の簡単な説明

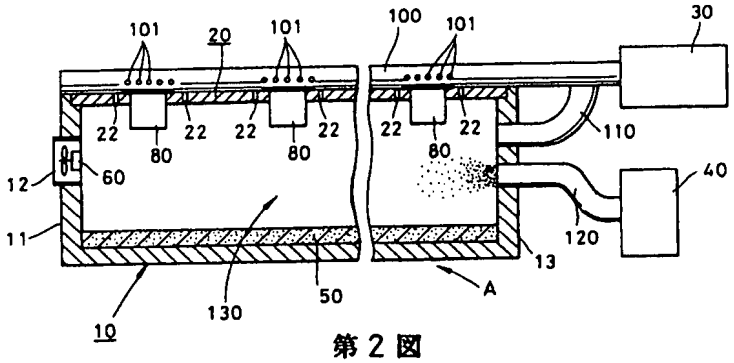
第１図は本発明に係る水耕栽培装置の一実施例を概念的に示した斜視図、第２図は第１図に示した実施例の縦断面図、第３図は栽培ポットの構造を例示した斜視図である。

Ａ…ベッド、１０…支持台、２０…パネル、２１…ポット挿入穴、２２…通気穴、３０…送風機、４０…養液送給機、５０…保湿体、６０…換気扇、８０…栽培ポット、９０…植物。

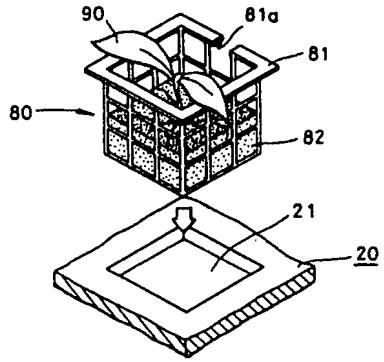
出願人　スズキ株式会社
代理人弁理士　木村高久



第1図



第2図



第3図